of France contains two species of Antedon, the oldest yet known, and the genus occurs together with Actinometra, in the Lower Oolites of both France and England; while if *Bourgueticrinus ooliticus*, McCoy, is a Thiolliericrinus, as supposed by de Loriol, then it is the earliest known species of this remarkable genus.

The fifth chapter is on the classification of the family, and is followed by the descriptions of the specimens. In a seventh chapter there is a detailed account of the bathymetrical distribution, and a station list of all the "Comatulæ" which were obtained by the various British Expeditions for deep-sea exploration between the years 1868-82. Appended to this is a list of all the known living species of Comatulæ, with their distribution in depth and space. As to the latter, all the principal stations are given. In the analysis of this list (p. 383) the total number of living species is given at 180, but from the list itself there would seem to be 188 species. Possibly the seven additional species of Antedon and the one species of Actinometra named but not described may account for this discrepancy. The Report is accompanied by seventy plates.

In congratulating the author on the successful accomplishment of his onerous task, we allude to his apology for the delay in its publication to state our conviction that none such was needed. Investigations like those here recorded might be more quickly accomplished were it possible to devote to them the whole working hours of the investigator's life; but when instead they have to be carried on during the hours of rest from arduous professional duties, hours that might more prudently have been devoted to repose, the case becomes quite different, and the wonder to us is that so much has been done within the time.

The second memoir in the volume is a Report by Sir Wm. Turner on the Seals collected during the voyage. In the first volume of these Reports, Sir W. Turner's Report on the Bones of the Cetacea which had been collected by the Expedition appeared. In the present Report we have detailed descriptions of the species of Macrorhinus, Leptonychotes, Otaria, and Arctocephalus, procured at the Kerguelen and Heard Islands, off the Falklands, in Messier Channel, and at Juan Fernandez. This is followed by an outline of the classification of the Pinnipedia, in which the diagnoses of all the genera and those of most of the known species are given.

In a third part there is a description of the brain of the elephant seal and of the walrus, with a comparison of the convolutions of the brain of the seals and walrus with those of the brains of the Carnivora, and of apes and of man. Part IV. gives an account of the visceral anatomy of the elephant seal. In an appendix there is an elaborate account by Dr. W. C. Strettell Miller of the myology of the Pinnipedia. Ten plates accompany this Report.

The third and last memoir in this volume is an exceedingly interesting supplement to his Report on the Actiniaria, by Prof. Richard Hertwig.

This supplement contains a description of additional specimens found from time to time as the various other groups of marine forms were being worked out. Amongst the material occurred species previously described, but enabling in a few cases fresh details to be added. Several, however, represented new and interesting genera, but in some cases the material was in so bad a state of preservation as to preclude description. Prof. R. Hertwig's Report was published in 1882, and since then Andres's monograph of the Actiniaria has appeared. Some criticisms on his classification preface the description of the new species; and a synopsis of the Hexactiniæ according to Hertwig's views, is given.

In the description of genera and species we find an account of a new species of Moseley's genus Corallimorphus, *C. obtectus*. It was found at Station 157, and on it Hertwig in his Report had chiefly based his description of *C. rigidus*, Mos., the type specimen of which latter has now been found. A new genus, Ilyanthopsis, is established for a single specimen from the Bermudas; it seems in shape intermediate between Aiptasia and Anemonia; it was attached. Aulorchis is a new genus belonging to the group of forms devoid of tentacles, the specimen (*A. paradoxa*) was found at Station 299, at a depth of 2160 fathoms. With the assistance of Dr. Erdmann, a revision of the Zoantheæ is given, based on an examination of the condition of the cœnenchyma, arrangement of mesenteries, structure of sphincter, condition of integument, and colonial formation. The solitary forms are relegated to Sphenopidæ, the colonial to Zoanthidæ, of which five genera—Zoanthus (Cuv., p.p.), Mammilifera (Lesueur), Epizoanthus (Verrill), Polythoa (Lamx.), and Corticifera (Lesueur)—are recognized. In an appendix a new genus and species is described, *Stephanidium schulzii*, found off Zebu, which appears to belong to the Zoantheæ, but differs in the absence of incrustations and the non-formation of a colony.

We notice one defect in this memoir, that the references to the authorities for known genera and species are omitted. There are four plates representing the new forms.

OUR BOOK SHELF.

A Bibliography of the Foraminifera, Recent and Fossil, from 1565 *to* 1888. By C. Davies Sherborn, F.G.S. Pp. i.-viii. and 1-152. (London: Dulau and Co., 1888.)

THE attention of naturalists for many years has been drawn to the minute animals of the sea, and with increasing interest as they have become better known by researches as well in abyssal as in shallow waters. Their fossil representatives have also long been noticed and extensively sought for in very many strata of different ages in various parts of the world.

The Foraminifera are among these multitudinous objects of interest to the microscopist, and through him to the naturalist in general, and the geologist in particular.

The simplicity of structure in the Foraminifera, and, at the same time, their manifold and indeed interminable varieties of form, often symmetrically elegant, have given rise to numerous namings and descriptions, often without adequate figures. Hence their nomenclature has been confused among the multitude of authors who have either mentioned, or more fully treated of, these minute organisms. Consequently, for a basis in determining the relative value of the so-called species, their right names, and order of discovery, a bibliography of the Foraminifera, having long been desiderated, was attempted by different writers in 1848, 1854, 1858, 1859, 1878, 1884, and 1886-8; but each of these catalogues was imperfect. We are pleased to be able to say that a complete list of the books and papers treating of Foraminifera is now before us, combin-

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ing accuracy and fullness of detail as to title, author, date, size, and place of publication. A short note of explanation or pertinent remark is in many cases added to the entries of the rare and little-known publications. Mr. Sherborn thus enumerates about 700 authors, with full title of book or memoir, carefully systematic abbreviation of titles of periodicals, and place of publication as given in the originals. Notices and general reviews having original information are included. Mr. Sherborn has examined all the works he has catalogued, with very few exceptions, and these are properly marked "not seen." The authors most prolific of memoirs are Brady, Carpenter, Carter, Dawson, De la Harpe, D'Orbigny, Ehrenberg, Folin, Fornasini, Gümbel, Haeusler, Hantken, Karrer, Jones, Munier-Chalmas, Neugeboren, Parker, Reuss, Robertson, Schlumberger, Schultze, Seguenza, Soldani, Stache, Terquem, Terrigi, Uhlig, Van den Broeck, Wallich, and Williamson. Former lists have evidently been carefully collated and corrected: and the life-dates (birth and death) of deceased authors have been entered as far as possible.

Several of the older papers are now catalogued for the first time, such as "Camerarius's papers, 1712 and 1717; Klein's, 1754; Schroeter's, 1803; and Wulfen's, 1791"; we also find "the correction of the hitherto inaccurate references to Spengler's papers; the original place of publication of Modeer's letter to Soldani; and Ricca's 'Discorso,' with the engraved portrait of Soldani"; and, "among those of scientific importance, . . . the earlier issue of Fichtel and Moll (which carries back their scientific names five years); D'Orbigny's list of the Foraminifera of the Vienna Basin, published by J. von Hauer seven years before the full description appeared; the note on D'Orbigny's 'Planches inédites'; Boué's paper on the Nummulites; and Silvestri's rare and interesting paper on Soldani's 'Testaceographia.' For the first time, too, an endeavour has been made to enumerate the important memoirs published by the Hungarian authors with some approach to completeness."

The whole work has been conscientiously done, with scrupulous exactness; and the industrious author has made it a labour of love for several years, since he began to study Foraminifera. Having so full a knowledge of the subject, he might with advantage, we venture to think, give further aid to students and others by publishing an index and synonymy of all the recorded genera and species of Foraminifera.

In the preface to the bibliography, Mr. Sherborn fully acknowledges the help he has received from his many friends at home and abroad; and he refers to such analogous and collateral bibliographies as have been aids in his research. This work will without doubt be fully appreciated by biologist and palæontologist; and we cordially agree with the author in his remark that "sincere thanks are due to Mr. F. Justen (Dulau and Co.), to whose generosity and scientific sympathies I owe the publication of my manuscript." T. R. J.

Earth Knowledge. Part II. By W. J. Harrison, F.G.S., and H. R. Wakefield. (London: Blackie and Son, 1888.)

THIS book, in conjunction with the companion volume issued a few months ago, is chiefly intended for the use of students preparing for the Science and Art Department's examinations in Physiography. The book is far too small for its subject, and in consequence, only very bare outlines of the different branches of the subject can be given, and much is omitted which we should expect to find. It is scarcely possible, for instance, to give an adequate amount of information about the sun in half a dozen small pages; yet the authors have attempted to do this, and the result is what might be expected—namely, a very scanty chapter. No mention is made of the fact that the corona is of variable form, and since only one drawing is given, a student would be likely to infer that its form is constant. Again, the possibility of observing prominences whenever the sun is visible, and the peculiarities and variability of sun-spot spectra are not touched upon at all. No chapter on the sun can be regarded as complete which does not treat of the various solar phenomena in relation to the sun-spot period.

Again, the classification of stars according to their spectra (p. 78) is not treated nearly so fully as its importance demands. Notwithstanding the fact that there are two distinct kinds of red stars, one giving indications of metallic fluting absorption, and the other of carbon absorption, we are simply told that in the red stars the lines are more numerous than in stars like Arcturus (p. 79).

On p. 126 we read:—"Although the sun's mass is so very much greater than that of the moon—being nearly sixty million times as great—yet the tide-producing force of the sun is only about seven-sixteenths that of the moon, because the sun is nearly 400 times farther off the earth than the moon." Although this statement is quite true, a little further explanation is necessary to make it consistent with the arithmetical fact that sixty millions is greater than the square of 400. It is only fair to say, however, that the importance of considering the differential attractions of the sun and moon on opposite sides of the earth, instead of the total attractions, is well brought out with regard to the precession of the equinoxes.

On the whole, the drawings are excellent, but that on p. 29, showing the action of the spectroscope, is rather misleading; we would remind the authors that the slit is usually placed in the principal focus of the collimating lens, and that there is nothing to converge the rays of light to a point inside the tube.

Without the aid of a well-informed teacher, the book is far from sufficient to fulfil the purpose for which it has been written.

An Introduction to the Science and Practice of Photography. By Chapman Jones, F.I.C., F.C.S. (London: Iliffe and Son, 1888.)

WE have here quite a new departure from the ordinary books on photography, the subject being treated not from the mechanical but from the scientific point of view, and the author has succeeded in placing before us a very useful work.

The volume is divided into three parts. The first consists of fifteen chapters, the more important among them treating of the transmission and intensity of light, reflection by plane and concave mirrors, refraction of light and the forms and properties of lenses, &c., concluding with a chapter on the spectroscope, colour-sensitiveness, and the absorption of light. In Part II. are described various forms of cameras, camera-stands, exposure-shutters, followed by some very interesting chapters on the history and special properties of the many and various forms of lenses. Part III. consists of twenty-four chapters extending over 100 pages, in which are described the manufacture of collodion and gelatino-bromide plates, and all the different modes of developing, printing, toning, &c., including carbon-printing, Woodburytype, and other photo-mechanical processes.

In the appendix are tables of English weights and measures, and a comparison of them with the metrical system, preceded by an explanation of the methods of testing lenses. The volume is well illustrated, and the varied information contained in it ought to give it a wide circulation.

Numerical Examples in Practical Mechanics and Machine Design. By Robert G. Blaine, M.E. (London: Cassell and Co., Limited, 1888).

IN this volume there is an excellent collection of examples, the teaching power of which has already been

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